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DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE NEWS LETTER

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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

NEWS LETTER

FOR DECEMBER 1941

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REMEMBER PEARL HARBOR

OBITUARY

A. C. Davis

Alonzo C. Davis, assistant entomologist of the Division of Truck Crop and Garden Insect Investigations, who was stationed at Beltsville, Md., died suddenly on January 4. Mr. Davis was born in Honolulu, T. H., on March 4, 1901. He received the following degrees from the University of California: A. B., in 1926 and M. A., in 1927. During 1926 and 1927 he was employed by the Bureau for seasonal work on the pepper weevil project in California. From 1927 to May 31, 1931, he was employed as an agent, in cooperation with the University of California, on this same project. He was appointed as assistant entomologist and was assigned to mushroom investigations at Arlington, Va., on June 1, 1931, being transferred later to Beltsville, Md.

Mr. Davis accumulated a wealth of practical information on the biology and control of insects and related pests which attack mushrooms, and is the author of several bulletins issued by the Department on this subject. Incidental to his formal assignment, in recent years he has been engaged on investigations of thrips attacking roses.

Early in his career he became interested in the natural history and taxonomy of certain Coleoptera and the insect fauna of rodent habitats. Several valuable papers have resulted from these observations and studies.

Mr. Davis' service was characterized by a sincere devotion to duty and an inherent desire to do a thorough job of whatever he undertook. Although his career was short, he left behind him an excellent record, not only in the Bureau but with officials of the mushroom industry, with whom he worked closely.

He is survived by his wife and four children.

J. L. Webb

On January 20, 1942, Jesse Lee Webb died at Washington, D. C. He was born in Bloomington, Ill., on April 9, 1878. He attended the public schools in Rippey, Iowa, and graduated from the Washington State College, receiving the degree of B. S., in 1900. He received the M. S. degree from West Virginia University in 1902.

Mr. Webb's term of service with the U. S. Department of Agriculture extends back to 1901, when he started work with the Bureau of Forestry, now the Forest Service. In 1903 he carried on entomological work with the Insular Government in the Philippine Islands for 3 months, returning to the Department to continue his work with the Bureau of Forestry. In 1904 he was transferred to the Bureau of Entomology, where he carried on miscellaneous insect investigations until 1909, when he was assigned to work on forest insects. In 1912 he was transferred to Southern Field Crop Insect Investigations and devoted considerable of his attention to rice pests. He contributed many valuable publications to the literature of economic entomology and his biological studies on horse flies were outstanding. From 1928 to the time of his death he was associated with investigations on insects affecting man and animals and showed much ability in preparing scientific material for popular consumption.

In 1904 Mr. Webb was married to Florence Evans and is survived by his widow and his only son, Delmar Evans Webb.

BUREAU EMPLOYEES CALLED TO THE COLORS OR TRANSFERRED TO SPECIAL NATIONAL DEFENSE ASSIGNMENTS

Hill, Henry J., Unskilled Laborer, Truck Crop Ins. Resigned December 31, 1941, to enlist in U. S. Army.

Jackson, Calvin W., Agt., PBW, inducted, Select. Serv., November 6, 1941.

Ozanne, Theodore W., Agt., Mexican Fruitfly Cont. Resigned January 10, 1942, to enlist in U. S. Army.

"Ex-Blister Rusters" on Midway and Wake Islands.--Now that the small Pacific islands of Midway and Wake have been so much in the public eye it will be of interest to know that several hundred men from the Rogue River Valley of southern Oregon, many of them "ex-blister rusters," were among the labor crews employed on these islands on National Defense improvements. So long as the ammunition held out these old squirrel snipers should have given a good account of themselves.

FRUIT INSECT INVESTIGATIONS

Fecundity of the raisin moth.--Pairs of adults of Ephestia figulilella Greg., from larvae reared on dried mulberries in an incubator at 82° to 84° F., were held in celluloid vials at room temperatures during their egg laying. The work was done at the Fresno, Calif., laboratory by Oscar G. Bacon, using 50 pairs of moths. Half of them were given water and the others received

25-percent solution of honey. The females given water deposited an average of 350.6 eggs, while those given diluted honey averaged 306.5 eggs. The largest daily batch contained 190 eggs, and the most prolific female laid 692.

MEXICAN FRUITFLY CONTROL

No Mexican fruitfly taken since August.--The last Mexican fruitflies to be trapped in the lower Rio Grande Valley were taken in the Laredo district early in August. Since that time an average of 9,000 traps have been operated monthly without taking any *Anastrepha ludens* Loew. Usually about 20 flies are trapped before January 1, and, while the late appearance of flies this season indicates a probably light infestation, it should not be taken as an indication that the Mexican fruitfly will not be abundant in the regulated area before the harvesting season is completed. Fruit shipments for the season through December 31 totaled 12,174.3 equivalent carlots, which is slightly greater than the amount of fruit shipped during the same period in 1940. Weather was favorable for field work during December and 1,912 groves were inspected. A large amount of insect-damaged fruit was inspected, but no larvae were found.

CEREAL AND FORAGE INSECT INVESTIGATIONS

Parasitization of European corn borer in southeastern New England.--Charles A. Clark, Moorestown, N. J., reports that a field survey to determine the status of parasitization of the summer generation of the corn borer (*Pyrausta nubilalis* Hbn.) was conducted late in July 1941. The areas included were 491 square miles in southeastern Massachusetts and 177 square miles in central Connecticut. In the Massachusetts area parasitization averaged 24.9 percent, as compared with 40.0 percent in 1940. This reduction is attributed to a sharp decline in effectiveness of the dominant parasite, *Macrocentrus gifuensis* Ashm., combined with or immediately following a great reduction in borer population. The tachinid parasite *Lydella grisescens* R. D. was also less effective in this area in 1941 than in 1940. *Inareolata punctoria* Roman and *Chelonus annulipes* Wesm. were recovered in some numbers in the southeastern Massachusetts area. In the central Connecticut area an increase in parasitization both by the locally dominant *I. punctoria* and the less important *L. grisescens* was recorded in 1941, as compared with 1940, notwithstanding an apparently great reduction in corn borer population. In the area surveyed in 1941 parasitization was 47.0 percent, of which 41.3 percent was by *I. punctoria* and 4.6 percent by *L. grisescens*. Of particular interest and importance was the first recovery in central Connecticut of *M. gifuensis* released here in 1940.

Egg masses of European corn borer produced for manual infestation of experimental corn varieties.--Ray T. Everly, Toledo, Ohio, reported that during the period June 16 to July 5, 1941, 63,200 moths of *P. nubilalis*, comprising 32,600 males and 30,600 females, were collected at Toledo from a large field cage, which had been stocked in the previous fall with cornstalks heavily infested with hibernating corn borer larvae. Of the moths thus produced, lots were placed within oviposition cages in a room maintained at 78° F. and over 90 percent relative humidity. Here the moths deposited egg masses on waxed paper sheets placed in the cages for that purpose. Subsequent pinning of these masses entailed a loss of 14.5 percent, while 4.5 percent of the masses were discarded as of abnormal size, it being considered that any containing more than 40 or less than 10 eggs were unsuited for infestation purposes. These operations resulted in 131,887 egg masses of normal size, available for manual infestation of corns grown at Toledo in the resistant-variety tests. Of these egg masses, 90,906 were placed on field corn and 40,981 on sweet corn.

Toughness of plant tissue and resistance to European corn borer.--According to G. T. Bottger, Toledo, extensive tests were conducted with a special spring puncturing device for the purpose of measuring physical resistance to puncturing of green leaf tissue of five different strains of corn, including both dent and sweet types, and its possible relation to the corn borer resistance inherent in some of these strains. Leaf resistance to pressure puncturing increased as plant maturity advanced. There were no significant differences in leaf resistance to puncturing between any of the five strains tested, when based on averages of all values for each strain. Tests made of seven strains of dent, sweet, and popcorn types at the same stage of maturity (within 2 days before tassel appearance) showed statistically significant differences between certain strains, but the results were too erratic to indicate any strain relationship to the physical resistance of leaf tissue within types; consequently, no relation between leaf resistance to puncturing and corn borer resistance was indicated. The data did, however, indicate that the toughness of corn-leaf tissue is associated with types of corn and to this extent may possibly be related to corn borer survival, resistance to puncturing being less and corn borer survival greater, in general at the same stage of maturity, in the sweet and popcorn types than in the dent type of corn strains tested.

Hydrogen-ion concentration and resistance to European corn borer.--Mr. Bottger also reports that in order to study the possible relation of pH readings to corn borer tolerance, pH tests were made at six successive intervals on seven different varieties of corn. The tests were made in the field on growing plants. The electrometric method was employed, utilizing a factory-sealed glass electrode and saturated calomel electrode with a Beckman pH meter adapted for making pH readings directly from the calibrated potentiometer dial. The data indicate a curvilinear relation of pH readings of corn-plant tissue and maturity. Statistically, the pH readings of R4 X L317 (resistant) and Golden Cross Bantam (intermediate) are lower than readings for popcorn (intermediate) and the sweet corn strain Mich. 1828 (resistant). The pH readings for R4 X Hy (resistant) also averaged significantly less than did those for popcorn (intermediate). While significant physiological differences are doubtless reflected in these strain differences, no relation of pH readings to corn borer resistance in the varieties tested is indicated. In view of indications of the data and known facts gathered from other experiments incident to nutrition investigations of the European corn borer, it is concluded that pH readings of growing plants may have some utility in determining relative concentrations of certain chemical substances in growing corn plants and in this capacity may possibly be useful in determining relative resistance of corn varieties to the European corn borer.

Commercial-scale field tests indicate feasibility of controlling hessian fly by use of resistant varieties.--W. B. Noble, Sacramento, Calif., states that in 1941, for the third successive year, the fly-resistant wheat Big

Club 38 (Dawson X Big Club[3]) was grown on a commercial scale under field conditions in a section where hessian fly has long been abundant. In 1939 this wheat showed no fly infestation and noticeably outyielded nearby regular Big Club, in which 64 percent of the plants were infested. In 1940, 4 percent of the plants of Big Club 38 were infested and it yielded 30 percent more grain than adjacent regular Big Club, in which 69 percent of the plants were infested. Yield figures for the 1941 commercial planting are not available, but in this field only about 2 percent of the plants were infested, while four neighboring fields of regular Big Club had an average plant infestation of 79 percent. In the 1941 nursery Big Club 38 was uninfested and yielded 69 percent more grain than did nearby regular Big Club, in which 100 percent of the plants were infested.

JAPANESE BEETLE CONTROL

Infestations in inspected material.--During the month 76 gypsy moth egg clusters and 1 brown-tail moth webbing were removed from products submitted for gypsy moth inspection and certification. This material was destined to points in Minnesota, Maryland, Ohio, New York, Virginia, Illinois, Connecticut, Michigan, New Jersey, and Pennsylvania.

Christmas-greenery inspection.--More than 20 tons of balsam boughs were inspected at Arlington, Mass., for making wreaths and table pieces to be shipped outside the gypsy moth area. Christmas-tree inspection in the Greenfield, Mass., area was greatly increased over that of last year. Dealers in mixed greens in this area reported that their business this year exceeded that of 1940. Shipments of Christmas trees and greenery from the White River Junction, Vt., district was heavier than in recent years. During December, 20,935 trees were certified in the latter area for shipment to New York, Pennsylvania, Florida, and a few other States.

Large temporary inspection force.--During December, 31 temporary inspectors were engaged in gypsy moth inspection work, 28 of whom were employed on the inspection of Christmas trees and evergreen boughs, 2 on nursery products inspection, and 1 on forest products. Extra work performed by the temporary men included extensive scouting operations in the Greenfield, Mass., district, where 52 bough lots, comprising 2,308 acres, were scouted. Twenty-two of these were found to be infested. In addition, 3,430 100-pound bales of boughs were inspected piece by piece. In all, 12,093 bales of boughs were certified from this area. A total of 20,314 Christmas trees were hand inspected.

Christmas tree certified for shipment to Iceland.--At the request of the Maine Department of Agriculture, the district inspector at Portland certified a 25-foot Christmas tree for shipment to Reykjavik, Iceland. At Augusta, Governor Sewall attached a Christmas message and the tree was trucked to the Brooklyn, N. Y., Navy Yard, where it was transferred to a naval vessel for transportation to its destination. The tree was consigned to a lieutenant who had written to his parents from Iceland that he feared Christmas trees would be hard to find on the barren island. His father thought it would be nice to send a community tree as Maine's gift to the soldiers and sailors at this North Atlantic outpost. Permission from both the Army and Navy was required before this shipment could be made. The War Department specified that the tree should be accompanied by a Federal gypsy moth certificate.

Unexpected freedom from infestation.--For several years heavy gypsy moth infestation has been prevalent in the towns of Conway, Jackson, and Bartlett, N. H. Observations showed that the infestation in these towns was confined to the valley areas and the foothills of the White Mountains. During December several carloads of square-edge lumber, which had been sawed early in the spring and piled for air drying in and among birch-tree growth, were piece inspected. No gypsy moth egg clusters were found. Ordinarily lumber piled under such circumstances in an infested area during the egg-laying season would be found infested. The extremely early hatching of egg masses in the spring of 1941 was apparently responsible for the high mortality of the moth larvae in these towns.

Decorative material accompanying game birds certified.--Over 500 certificates were issued during the month to cover individual cartons containing a brace of pheasants, with a background of spruce boughs, a few pine cones, and branches of elderberry for decoration. This decorative material required gypsy moth inspection.

Certification refused at infested nursery.--Upon the finding of 11 gypsy moth egg clusters on blue spruce trees submitted for inspection at a nursery located in central Connecticut, certification of the inspected trees and all other stock from the unit involved was suspended. Four of the clusters were found on November 28 and 7 on December 1. Connecticut State Nursery Inspector M. P. Zappe closed this nursery unit against further shipments until it has been freed from infestation and has again been inspected and certified by the State.

Power company stations man for elm disposal.--The following incident indicates the extent of cooperation being received from utility companies in Connecticut. One of our crews in Middlesex County had occasion to haul some elm wood to a town dump to be burned. They found there a man from one of the power companies who was stationed for an indefinite period to take care of elm wood, which the power company's trucks were hauling into the dump for disposal. As the larger elm logs were brought in, the man was boring a series of holes in them, charging the holes with dynamite and exploding the charge with the battery from his car. In this way he was splitting the larger logs into small enough pieces so they could be more easily handled and burned more quickly.

W. P. A. Dutch elm disease personnel reduced in Connecticut.--By action of the State W. P. A. during the week ended December 13, personnel on the Dutch elm disease project in Connecticut was reduced by 55 percent. The laborers transferred from the project were assigned to airports and other first-priority National Defense projects. The personnel retained was almost entirely within the border zone, with a comparatively small number not actually living in that zone but sufficiently close to it so they could be used entirely within the zone. Work within the infection zone necessarily was virtually discontinued.

Crew extinguishes fire set in swamp.--While sanitation workers were burning several woodpiles accumulated prior to the hunting season on a hunting reservation in Pike County, Pa., the caretaker requested the general foreman to set the whole swamp on fire and burn it off. Our men refused to start the fire, whereupon the caretaker started fires in the swamp while Dutch elm men were burning woodpiles. As soon as this condition was discovered, all hands began fire fighting and extinguished the blaze set by the caretaker. This incident could have resulted in a serious, unjustifiable accusation against the project, had the fire escaped into the forest.

Scolytus attacks healthy elms.--It has become increasingly evident that during last summer and fall S. multistriatus in large numbers has been attacking apparently healthy, full-leaved elms. In the first half of the month this condition was discovered in 3 widely separated locations in Pennsylvania. The number of trees attacked in any 1 location ranged from 3 or 4 in one spot to 25 and 40, respectively, in 2 other counties. Most of these trees were slippery elms. An item of interest in connection with this condition is that at each location woodpeckers had already begun to feed heavily on beetles in the infested trees.

Elm tree stripped of bark by woodpeckers.--A beetle-infested tree removed in Sussex County, N. J., in December had been completely stripped of its outer bark by woodpeckers, making it look more like a sycamore than an elm. C. W. Collins, of the Morristown laboratory, was notified and on examining the tree and taking pictures of it, said that he had never seen a tree in such bad shape as this one. The greater number of the beetles had emerged, but there were still numerous larvae left in the inner bark.

Clerk loaned to recruiting office.--The clerk in the headquarters office at Bethel, Conn., was temporarily assigned to the United States Navy Recruiting Station in Danbury, because of the rush of enlistments in the Navy following the attack by the Japanese on December 7. She was returned to the office with a letter of appreciation from the recruiting officer, stating that she had been of considerable service during an unprecedented rush of business.

Elm wood hauled to Army camps in New Jersey.--In the latter part of the month, 17 loads of elm wood approximating 24 cords were delivered to the army encampments around Paterson, N. J., to be used as fire wood. This Division was advised that the camps could use about 100 cords for their immediate requirements.

W. P. A. Federal agency project discontinued.--At the end of December, the W. P. A. Federal Dutch Elm Disease project was closed out, with the expectation that it would later be resumed under the sponsorship of the various State W. P. A. agencies.

Methyl bromide fumigation activities.--A large plant grower at Bound Brook, N. J., recently completed a new fumigation chamber with a capacity of approximately 600 5-inch potted plants. The grower has fumigated large numbers of hydrangeas and reports very satisfactory results with his new unit. This grower used his fumigation chamber not only for Japanese beetle certification purposes, but for destroying all insects infesting his plants. Because of the apparent stimulating effect of methyl bromide fumigation on some varieties of hydrangeas, the grower expects to save coal that would otherwise be used in growing on these plants. Some of his customers are demanding fumigated plants, because they save at least 2 weeks in propagation. Members of the treating section of the Division conducted an experimental methyl bromide fumigation of canna roots at a Long Island establishment. Beetle infestation was found there for the first time this summer. The fumigated roots are now being tested in the greenhouse for damage. If no harmful effects are noted, this firm may construct a sizable chamber to eliminate hand inspection of thousands of these roots that will be shipped to nonregulated points and to other classified dealers within the regulated zone this spring. Another Long Island establishment sterilized 60,000 spirea clumps in their methyl bromide fumigation chamber.

Morning after Pearl Harbor (actual telephone conversation at New York City office, December 8).--"Agriculture, Bureau of Entomology and Plant Quarantine." "Is this the Japanese Beetle Office?" "Yes." "This is Reuters British News Agency. I saw your listing in the telephone directory. Just what do you have to do with the Japanese?" "We don't do anything for the Japanese. We enforce a plant quarantine to prevent the spread of the Japanese beetle. This is an insect that was accidentally introduced into this country from Japan." "How long has this been going on?" "In the neighborhood of 25 years." "Oh, then it isn't something that started since the war?" "No, the beetle was discovered in this country in 1916." "Do you have any Japanese working for you?" "No, there are none working here, and none in the Bureau to my knowledge. If you want any more definite information you can call our Bloomfield, N. J., field headquarters." "Well, that won't be necessary. I think you have given me all the information I wanted. Thank you!"

Mild weather a boon to nurserymen.--Nurserymen on the Eastern Shore of Maryland and Virginia reported that, owing to the unusually mild weather prior to Christmas, they were able to dig stock and fill and ship orders which, under ordinary circumstances, would not have been filled until the regular spring shipping season. This was especially gratifying to nurserymen, as it partially solves their labor-shortage problem. One large Maryland nursery required the services of an inspector on 24 of the 27 working days in the month. In the Syracuse, N. Y., area, the mild weather permitted the inspection of bare-rooted nursery stock until late in the month. Most of this stock was placed in storage for spring shipment. Nurseries in the Harrisburg, Pa., area made many shipments to southern points during the open weather.

Late interception of infested material.--A midwinter interception of beetle-infested material was made at the Japanese beetle highway inspection station on U. S. Route 1 at Fredericksburg, Va., when 2 Japanese beetle grubs were removed from soil about the roots of 12 miscellaneous plants being transported by a motorist from New York City to Miami, Fla.

European corn borer certification discontinued.--The limited amount of European corn borer inspection and certification work performed by inspectors throughout the Japanese beetle and gypsy moth regulated areas, as well as in Michigan and Indiana, was discontinued after December. Arrangements were made by the Bureau with plant quarantine officials in the infested States to take care of the added inspection duties, and States that had theretofore required Federal corn borer inspection and certification agreed to modify their quarantines so that such products would be accepted on the basis of State certification.

FOREST INSECT INVESTIGATIONS

Report on elm hanger study and resultant bark beetle attack concluded.--On December 2 R. J. Kowal, Morristown, N. J., completed the examination of 124 hangers and 35 hanger stubs for attack of elm bark beetles and the Dutch elm disease fungus. This study was begun in June 1940 in an effort to determine the importance of wind- and ice-damaged limbs insofar as they furnish breeding material for the principal insect vectors of the Dutch elm disease fungus, namely, Scolytus multistriatus Marsh. and Hylurgopinus rufipes (Eich.). Attention was also given to the possibility of the fungus being introduced into elm trees directly by beetles attacking the hanger and the remaining stub. The results of the creation of hangers in all months of the year showed that no attack by S. multistriatus would be expected in limbs felled from October to February. September hangers having no living attachment were in all cases attacked but the resulting progeny died in all cases. Attack and development were obtained in hangers created from March to August, inclusive. S. J. Smucker, of the Bureau of Plant Industry, examined the 35 hanger stubs. Discolored streaks in the xylem, usually emanating from the cut end of the stubs, were found in approximately half of the 35 stubs. All discolored streaks were cultured. One discolored streak 1-1/16 inch long and 3/16 inch from the dead portion yielded Ceratostomella ulmi Buisman. This streak appeared to have originated from a beetle attack, which scored the xylem.

Effective introduced parasite of Neodiprion sertifer (Geoff.).--C. L. Griswold, Morristown, reports that Microplectron fuscipennis Zett., a European prepupal parasite of Gilpinia polytoma (Htg.) and Neodiprion sertifer (Geoff.), was originally introduced into Canada and New England to assist in combating G. polytoma. With N. sertifer attaining outbreak proportions in New Jersey in 1938 and 1939, liberations of this parasite were made in several infested localities in June 1939. Establishment of this parasite was found to have taken place in some of these infested areas in 1940, including an area at Lamington, N. J., where severe defoliation on red pine occurred yearly since 1938. In December 1941 a search was made at the Lamington, N. J., area for cocoons of N. sertifer for the purpose of determining whether or not another introduced parasite of the sawfly had been established since its liberation in 1940. The search disclosed that a very large proportion of the sawfly cocoons found, both old and new, had previously been attacked by M. fuscipennis. An examination of the red pine needles also revealed a very limited egg deposition by N. sertifer, forecasting a greatly reduced infestation in 1942, for which the rapid build-up and effectiveness of M. fuscipennis is believed to be responsible.

Nursery elms and their susceptibility to Hylurgopinus rufipes.--R. T. Webber, Morristown, reports that during the period December 8-18, 1941, inclusive, 135 nursery elms located in 6 nurseries in New Jersey were examined for H. rufipes infestation. This examination was made for the purpose of obtaining additional data on the susceptibility of nursery elms to attack by H. rufipes, which is a carrier of the Dutch elm disease fungus. These trees ranged from 1.0 to 6.0 inches in diameter, with an average of 2.7 inches. As a result of this examination, it was found that the elm stock in 3 of the nurseries inspected showed conclusive proof of Hylurgopinus attack. Moreover, in 2 of the 3 nurseries where an infestation existed, hibernating beetles were present in variable numbers. The data, arranged in tabular form, follows.

Diameter of trees 6 inches above ground (inches)	Trees examined	Trees with evidence of: H. rufipes attack	H. rufipes bark cells	Bark cells occupied by living adult H. rufipes
	Number	Number	Number	Number
0.75 to 1.50	20	2	2	0
1.51 to 2.50	55	8	28	5
2.51 to 4.00	42	14	102	25
4.01 to 5.00	14	4	38	5
5.01 to 6.00	4	2	14	0
Total	135	30	184	35

Scolytus multistriatus prevalent in Ohio River Valley.--D. E. Parker, of the Columbus, Ohio, forest-insect laboratory, reports that the smaller European elm bark beetle (S. multistriatus) is becoming more prevalent in the watershed of the Ohio River, where the phloem necrosis disease of elm is active. The killing of elms by this virus disease supplies large amounts of breeding material suitable for Scolytus. S. multistriatus was first recorded in Columbus in 1939 in one section of the city. At present most of the trees killed by phloem necrosis in all sections of the city are very heavily infested. Other disease areas in Ohio and adjoining States present a similar situation.

Western pine beetle survey finally completed.--According to F. P. Keen, Portland, Oreg., the annual pine beetle survey of Oregon and Washington, a cooperative undertaking between the Forest Service, the Indian Service, and the Bureau of Entomology and Plant Quarantine, was completed late in November. Curtailment of C. C. C. funds made it necessary to drop the training school, which heretofore had preceded the survey work. Notwithstanding these difficulties, the crews covered 71,360 acres, a 0.65-percent survey of the 11,000,000-acre pine area in these two States.

Ips-caused damage decreases on the Ochoco National Forest.--Ips-caused damage to ponderosa pine reproduction following logging is being investigated by W. J. Buckhorn, of the Portland laboratory. He has found, from a study of the Wolf Creek logging area on the Ochoco National Forest, that damage caused by Ips oregoni (Eich.) occurs almost entirely during the first year following logging. On cut-over areas subject to attack in 1941, approximately 3 percent of the residual reproduction was killed by I. oregoni. On similar cut-over areas subject to attack in 1939 and 1940 the losses caused by this insect were 7 and 10 percent, respectively. The lessening of current losses is attributed, at least in part, to increased tree vigor resulting from the abnormally heavy precipitation of 1941 (News Letter v. 8, No. 12, p. 12, Dec. 1941).

High percentage of cocoons of an imported pine sawfly remained in diapause through 1941.--J. V. Schaffner, Jr., of the New Haven, Conn., laboratory, reports that the first serious defoliation by the European sawfly Gilpinia frutetorum (F.) in New England occurred in the fall of 1940 on a municipal watershed in Southington, Conn., where the defoliation of red pine trees on 5 acres ranged from 25 to 60 percent. The feeding in the fall of 1941 was fully as severe as that in 1940. Many acres in nearby stands are at present lightly infested. In July 1941 the duff in a series of samples covering a total of 528 square feet was examined with the following results:

Condition of cocoons	Cocoons found	
	Number	Percent
From which adult sawflies had emerged	2,629	21.24
Destroyed by mammals	1,924	15.54
Destroyed by predaceous and scavenger insects	1,293	10.47
Destroyed by hymenopterous parasites	2,543	20.54
Dead from unknown causes	449	3.62
Apparently healthy when collected	3,539	28.59
Total[1] (all conditions) found in samples	12,377	--

[1] As all cocoons were collected, some of them were 2 or more years old.

The 3,539 cocoons that appeared to be healthy were immediately isolated in glass vials for rearing in the laboratory. Early in the winter all unissued cocoons were dissected.

Rearing data	Number	Percent
Adult sawflies emerged July-September	1,860	52.56
Cocoons containing hymenopterous parasites	528	14.92
Cocoons dead from unknown causes	386	10.90
Cocoons alive and in diapause, December 1941	765	21.62

A further analysis of the data shows that for the entire collection, 4,489 cocoons, or 36.27 percent, produced sawflies and 3,071, or 24.80 percent, were parasitized by Hymenoptera, 2,760 of these having been attacked by the European species Microplectron fuscipennis Zett. The outstanding points of these studies indicate that a high percentage of cocoons remained in diapause through 1941 (21.62 percent based on field collections examined in the laboratory). The importance of the multibrooded parasite M. fuscipennis is also shown.

Gypsy moth egg cluster population low at Eastford, Conn.--H. A. Bess, New Haven, presents the following data on the annual population of the gypsy moth egg clusters in the ecological study areas. The insect has never been abundant in the general region of Eastford, although it was found there over 25 years ago. Outbreaks have occurred in the other areas represented.

Winter	Eastford, Conn. (1,000 acres)[1]	Freetown, Mass. (220 acres)	Petersham, Mass. (80 acres)	Alfred, Maine	
				Tract 1D (120 acres)	Tract 1E (37 acres)
1936-37	[2] 0+	---	---	---	---
1937-38	0+	[3] 700±110	---	---	---
1938-39	0+	12±6	250±50	900±450	3,100±370
1939-40	0+	7±5	5±5	220±40	430±90
1940-41	0+	250±35	0+	---	230±40
1941-42	[4] 0	960±160	10±8	35±15	15±10

[1] Only 120 acres of the area was surveyed this fall but the remainder will be surveyedbefore spring.

[2] No egg clusters were present in the samples taken but a few were noted in the experimental area.

[3] The numbers are rounded to one-sixteenth of the standard error.

[4] No egg clusters were seen but probably a few are present.

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

Brush-disposal machines returned to storehouse.--The two brush-disposal machines, which have been operating in the field for several months, were returned to the storehouse at Greenfield, Mass., about the middle of December, after field conditions became favorable for burning brush. One of these machines had been in constant operation in Massachusetts since last September and had disposed of brush at gypsy moth infested sites in the towns of Sandisfield, Mount Washington, Alford, and Charlemont. The other machine was transferred to the field at about the same time, but was used for several weeks on properties in the Connecticut area, where authority to burn the accumulated brush could not be obtained, before moving to infested sites in Massachusetts. Although large quantities of brush and other waste wood were reduced to sawdust or small chips, very little mechanical trouble developed in either machine during their long periods of operation. The caterpillar tractor used in moving the machines from one pile of brush to the next was also returned to the storehouse. It has been equipped with a snow plow and is available for immediate service when needed.

Visit made to offices of State administrators.--During the first week in December A. F. Burgess, in charge of moth work; Eli Abbott, Jr., assistant administrator of the W. P. A. in Washington; and Paul P. Stewart, of the Secretary's office, visited the offices of the State administrators of Massachusetts, Connecticut, Vermont, and New York, to discuss problems connected with the change-over from Federal Agency to Federal W. P. A. projects under the State program, which will take place on January 1, 1942.

Gypsy moth colony found in town free from infestation for 15 years.--A gypsy moth crew, temporarily assigned to open scouting in Danby Township, Rutland County, Vt., during the open season for deer, discovered a small gypsy moth infestation in an old apple orchard. Danby was first infested by the gypsy moth in 1924, and several small and scattered infestations were also found in 1925 and 1926. Owing to intensive extermination measures conducted at that time, no further evidence of infestation was found in Danby until this year.

Gypsy moth work retarded in Massachusetts.--The unusual weather conditions, the modified scouting work necessary in Massachusetts during the deer-hunting season, together with a reduced force caused by workers taking time off to hunt, all contributed to an appreciable retardation in gypsy moth work in that State during the first week in December. Satisfactory progress had previously been made by the 8 crews of scouts and 10 crews of laborers working in the Massachusetts section of the barrier zone.

W. P. A. work in Connecticut restricted to treatment of infested areas.--The force of W. P. A. workers was reduced from 37 to 25 on December 8, at the specific request of the W. P. A. State administrator in Connecticut, who stated that this action was necessary in order to keep within the State quota, and that similar reductions were being made on other W. P. A. projects. This necessitated a change in the work plan, as the W. P. A. force was too small to perform both scouting and treatment work adequately. Several agents were detailed to make special surveys of large blocks of woodland in townships of the barrier zone where small and scattered gypsy moth infestations were found and treated several years ago, but where little or no check-up work has been possible during the last 2 years, because of the lack of available W. P. A. employees. In addition, 3 2-man crews of experienced agents were assigned to determine whether infestations exist in the most dangerous parts of the barrier zone area. These men will traverse the woodlands about 100 feet apart and will creosote all single egg clusters found. The centers of the larger infestations will be marked, in order that they can be readily located and treated by the W. P. A. crews. By this method, the entire time of the small force of gypsy moth workers now employed in Connecticut will be utilized in areas where their labors will be of maximum advantage to gypsy moth control work.

N. Y. A. gypsy moth work discontinued in Pennsylvania.--The N. Y. A. gypsy moth project was placed on the inactive list on December 3, and the men were either furloughed or transferred to projects more closely identified with National Defense. However, the N. Y. A. shop project was permitted to continue, as it was considered in the nature of defense work, because of the excellent mechanical training received by the enrollees.

Gypsy moth workers withdrawn from woods during deer-hunting season.--At the end of the first week in December, 34 W. P. A. gypsy moth crews were engaged in scouting and 12 crews were employed on ground or thinning work in the Pennsylvania area. These crews confined their activities to residential areas or to open country during the 2-week open season on deer, which began on December 1. All gypsy moth work in woodlands is suspended at this time, as there is always grave danger of injury to workers from stray bullets from high-powered rifles, which are permitted in Pennsylvania. Gypsy moth work in woodland areas was resumed on December 15.

PLANT DISEASE CONTROL

Federal Agency projects discontinued.--All Federal Agency W. P. A. projects in barberry eradication were terminated by December 31 or earlier. Bureau-sponsored W. P. A. projects were started promptly in January in all States in the area, except Ohio, South Dakota, and Wyoming. In Ohio the application was approved in December but the Presidential Letter was not received until January 5, 1942. In South Dakota the application has been approved but no project is being operated at present, due to shortage of labor in areas where survey is necessary, and also because of weather conditions. No labor program is anticipated for Wyoming. In general, the change from Federal Agency to State W. P. A. projects was accomplished with a minimum of confusion and interruption

Mild fall weather favors progress in Michigan.--The Federal Agency W. P. A project, started October 1, was terminated December 31. During this period intensive survey was conducted in Benzie, Grand Traverse, Huron, Kalkaska, Leelanau, Manistee, Sanilac, St. Clair, and Wexford Counties. M. E. Turner, State leader, reports that from the standpoint of results and accomplishments this was perhaps the best 3-month period of work that he has had for some time in Michigan. One important reason for this was the fact that W. P. A. officials approved an assignment quota of 200 employees for this period. In addition, weather conditions were very favorable for survey, and the personnel assigned was above average. On January 1 the entire Federal Agency personnel was transferred to the State W. P. A. project. It is expected that work will be continued on about the same basis, except that survey operations were suspended in St. Clair County because all laborers in that county were assigned to a certified Defense project. To supplement the loss of St. Clair County, survey operations were started in Genesee County.

Area of escaped barberry bushes in West Virginia.--W. M. Watson, State leader in charge of barberry eradication in West Virginia, reports an interesting find of barberry bushes in Marshall County. This area is located about 6 miles southeast of Moundsville and in the vicinity of the village of Rosby's Rock. Approximately 400 common barberry bushes were located on this property, and most of them were exceptionally large and heavily fruited. At least 2 were estimated to be more than 15 feet high. Although the bushes showed no evidence of aecial infection this year, nearly all farmers who were interviewed concerning stem rust problems agreed that grain crops of all kinds had been severely damaged by stem rust in past years. Some of the older residents in this area were questioned as to the location of the original planting responsible for the escaped bushes. Several of them related the story of the French wine maker, who developed the present Beebout property into a hillside vineyard. The wine maker was a lover of flowers and shrubs. Many important and rare shrubs were said to have been planted around the original home and only a few hundred feet from the site of the largest escaped bushes. The exact location of the original planting was never ascertained, but the present owner of the property is certain that the "spice hedge" planted in profusion around the wine shop was imported barberry. Several old residents in the area referred to the escaped bushes as wild "spice hedge." The old homestead and wine shop were razed about the turn of the century and the site was transformed into a tillable field. At present the entire area is overgrown, and only traces of the site remain visible.

Barberry eradication in Ohio.--In 1941 an inspection was made of all barberry locations in 10 Ohio counties. This inspection was conducted by a trained Bureau employee at times when his services could be spared from other duties. The purpose of this inspection was to check the effectiveness of previous eradication methods and to look for the presence of fruiting barberry bushes on old properties and nearby. Harry Atwood, State leader, reports that barberries were found on 3.2 percent of the 1,666 properties checked. Five new locations were found, only 1 of which had escaped bushes. Approximately 92 percent of the barberries were found on old properties. No seedlings were noted on any of the properties inspected; however, of the bushes found on old properties, 11.3 percent were fruiting, as compared to 13 percent of those found on new properties.

Barberry eradication project reorganized.--R. O. Bulger has been promoted to project leader to fill the vacancy caused by the new assignment of W. L. Popham, who on December 1 was made assistant chief of the Bureau in charge of control operations. L. Kenneth Wright, heretofore State leader of barberry eradication in Pennsylvania, will take Mr. Bulger's place as assistant project leader. The project headquarters have been moved from Washington, D. C., to Minneapolis, Minn., and all field operations, not only in barberry eradication but also in connection with rust surveys and barberry identification and susceptibility studies, will hereafter be handled through the Minneapolis office, which will report direct to the chief of the Division at Washington.

Blister rust damage to merchantable white pine on Pack Demonstration Forest.--At the 1938 blister rust control conference of supervisory personnel in the Northeastern States, Clifford H. Foster, director of the Charles Lathrop Pack Demonstration Forest at Warrensburg, N. Y., presented a very interesting paper on blister rust damage. Mr. Foster reported that 250,000 board feet, or 5 percent, of the standing pine timber on the forest would be lost from blister rust stem cankers which originated prior to the application of control measures. During the last 3 years, many established blister rust stem cankers have become more readily visible. For this reason, studies of blister rust damage now in progress at the Pack Forest have added to the total of observed old stem infections on merchantable timber. Mr. Foster now believes that his 1938 estimate of 5 percent potential loss from blister rust must be revised upward and may reach 20 percent, or 1,000,000 board feet, before the count is complete. This condition at the Pack Forest shows that old stem infections on large trees are not readily observed, even by competent trained foresters, until such time as these infections have become almost unavoidably fatal. Foresters or woodland owners may be led into a false sense of security by the lack of conspicuous cankers, when many of the best trees in the stands may be undergoing the last stages in the process of destruction. In his thinning operations Mr. Foster has found frequently that the crop trees he desired to leave for additional growth were the ones having stem cankers. In fact, such infected pines have frequently caused Mr. Foster to revise his management plans. Further serious blister rust infection in the forest, however, has now been prevented by the eradication of currant and gooseberry bushes.

White pine acreage increasing in northern Wisconsin.--White pine acreage is on the increase in some counties in northern Wisconsin. Several pine areas worked initially in 1936 were found to contain a greatly increased acreage of native pine, when given a second workin this year. One area in Marinette

County contained 75 acres of first-priority pine when worked in 1936. Five years later, in 1941, the same area was reworked and it had expanded to about 520 acres of first-priority pine. A substantial portion of this additional pine acreage consists of seedlings and small trees growing under aspen, which serves as an excellent cover crop for the young white pines. Ribes cynosbati bushes, from 2 to 3 feet high, were found generally distributed over that part of the area requiring initial eradication. This example of an increase from 75 to 520 acres of first-priority pine through natural reproduction is an indication of what is happening under favorable circumstances in other parts of the white pine region.

COTTON INSECT INVESTIGATIONS

Malvaceous plant, algalia, attacked by pink bollworm.--At the Presidio, Tex., laboratory many kinds of malvaceous plants are grown in small numbers to determine if there is danger that they may serve as hosts of the pink bollworm. On December 4, 60 mature seed pods of Abelmoschus abelmoschus from plants growing in close proximity to cotton were examined. Of these, 41 were found to be infested with pink bollworms. A total of 107 pink bollworms were taken, or an average of 2.61 per infested pod. This plant is grown occasionally as an ornamental in the extreme southern parts of the United States. The infestation of 68 percent in these seed pods at Presidio in 1941 was greater than in seed pods of this plant grown under similar conditions in Puerto Rico. In 1938 L. C. Fife stated: "Algalia (Abelmoschus abelmoschus) is occasionally grown in Puerto Rican gardens for its musk-scented seeds and for medicinal purposes. The large bristly seed pods average around 2-3/4 inches in length and 1-1/4 inches in diameter. Of 129 pods collected adjacent to infested cotton at Isabela, 10, or 7.8 percent, were found infested."

Pink bollworm hibernation in lower Rio Grande Valley.--The results of the last two seasons' work in the lower Rio Grande Valley have been summarized by W. T. Hunt, L. C. Fife, and A. J. Chapman, of the Brownsville, Tex., laboratory. As the field clean-up and closed season, when no fruiting cotton is permitted, are important measures used in the control program, an effort was made to determine the time and the place where long-cycle or hibernating larvae are formed under these conditions. Green and open bolls collected in July were examined for long-cycle larvae after keeping them under different conditions in the field for at least 30 days to permit pupation of short-cycle larvae. No long-cycle larvae were found in green bolls removed from the plants and exposed to the sun on the soil surface or in green bolls buried 3 to 4 inches deep. No long-cycle larvae were found in green bolls on plants that were cut and scattered over the soil surface, but larvae were found when the stalks were piled so that the green bolls were protected from the full force of the sun. No long-cycle larvae were found in open bolls placed on the soil surface in the sun, but larvae were found in open bolls buried 3 to 4 inches deep or on stalks cut and scattered over the field or placed in piles. The mean temperature for August was 83° F. and the precipitation 0.92 inch. Examinations of the soil beneath the bolls showed that the high temperatures had not caused the larvae to leave the bolls and enter the soil. No attempt was made to determine the percentage of larvae entering the diapause under these conditions, but it was definitely established that long-cycle larvae are found as early as the latter part of July. Long-cycle larvae were recovered from open bolls on and beneath the soil surface and on standing stalks in the lower Valley in each month from

November to April. No larvae have been found in cocoons in the soil, as is the case in arid regions. Open bolls were placed in hibernation cages on the soil surface, some were buried, and some were left on standing stalks between August 20 and December 10, to determine the duration of the resting stage. No survival was obtained from open bolls placed in cages on August 20, but from bolls placed on the soil surface in cages on September 26 moth emergence occurred as late as April 21 or after 207 days. The maximum duration of the resting stage was in open bolls on standing stalks. From material caged on September 25 the last moth emerged on June 11, or after 259 days. A higher survival also occurred in bolls left on standing stalks than in any other environment, emphasizing the importance of cutting all cotton stalks in the fall, even though the bolls are left on the ground. Between October 1, 1940, and May 31, 1941, the rainfall recorded at Brownsville was 26.54 inches, or 18.6 inches more than for the same period in 1939-40. Large areas of cultivated land were flooded on several occasions and, despite the fact that the hibernation cages were completely inundated for from 3 to 5 days on 5 different occasions, a light survival of pink bollworms occurred. It is known that excessive moisture increases larval mortality and expedites moth emergence, therefore very little carry-over to the 1941 crop was expected. The results of the bloom examinations, field inspections, and gin-trash examinations were in line with this expectation and showed considerable reduction over previous years.

Cotton dusting for insect control in Arizona.--T. P. Cassidy, Tucson, Ariz., and H. G. Johnston, extension entomologist, Phoenix, Ariz., report that 39,740 acres of cotton was dusted for insect control in Arizona in 1941. There was a total of 82,664 acre-applications of insecticides, or an average of 2.08 applications for each acre treated. For the control of Miridae, Pentatomidae, and other hemipterous insects 72,688 acre-applications were made on 29,924 acres of cotton, using a mixture of paris green 7.5 percent-sulfur 92.5 percent. This was applied at the rate of 15 pounds per acre-application, making a total of 1,090,320 pounds of the paris green-sulfur mixture used. For the control of the beet armyworm (Laphygma exigua Hbn.) and the cotton leaf worm (Alabama argillacea (Hbn.)) 9,978 acre-applications were made on 9,816 acres of cotton, using calcium arsenate dust at the rate of 8 pounds per acre-application, making a total of 79,808 pounds used. Ground machines were used in making 6,120 acre-applications and airplanes were used for 76,544 acre-applications. During 1941, 2 airplane companies operated in Arizona. The Agricultural Marketing Service of this Department estimates that 239,000 acres of the 1941 crop will be harvested in Arizona. The 39,740 acres dusted for insect control is therefore 16.6 percent of the acreage in Arizona. Before the investigations of Mr. Cassidy and his associates showed that dusting of cotton with insecticides is often a profitable practice in Arizona, practically none of the cotton in that State was dusted.

TRUCK CROP AND GARDEN INSECT INVESTIGATIONS

Diffusing odor of isoamyl salicylate in hornworm control.--L. B. Scott and Joe Milam, of the Clarksville, Tenn., laboratory, report the results of tests conducted in triplicate with several methods of diffusing the odor of isoamyl salicylate for attracting hornworm moths Protoparce sexta (Johan.) and P. quinquemaculata (Haw.). The standard vial-and-wick combination, consisting of a 1-inch vial, a short length of lamp wick, and a loosely fitting cork, was found to be less than one-fourth as effective as was 3 ounces of lump fuller's earth placed in a small cloth bag and soaked with isoamyl salicylate. Rottenstone, charcoal, or Irish moss prepared in the same manner as the fuller's earth, or a 2-square-inch block of plaster of paris soaked in isoamyl salicylate, was found to be only slightly less effective than the fuller's earth. Following is a summary of the results based on 15 days' exposure of the materials during a period when moths were very scarce.

Diffusing material	Number of moths recovered						
	Northern[1]		Southern[2]		Total		Total
	Males	Females	Males	Females	Males	Females	Male and female
Vial and wick-------	4	3	15	3	19	6	25
Fuller's earth-----	12	18	72	26	84	44	128
Rottenstone---------	9	19	56	25	65	44	109
Charcoal------------	8	13	52	23	59	37	96
Plaster of paris---	16	12	44	19	60	31	91
Irish moss----------	9	7	50	18	59	25	84

[1] *Protoparce quinquemaculata*.

[2] *P. sexta*.

Aphids infesting potatoes in relation to prevalence of leaf roll.--From a survey conducted in Aroostook County, Maine, during the summer of 1941 by this Bureau, cooperating with the Maine Agricultural Experiment Station, W. A. Shands and G. W. Simpson, of the Presque Isle laboratory, conclude that the large increase in the incidence and damage from the leaf roll disease in potatoes in that district in recent years may have been influenced by a change in the relative abundance of the species of aphids infesting potatoes, rather than by a change in the species. A comparison of the data from this survey with those obtained by Simpson in previous years discloses that, although the species of aphids found on potatoes were the same as those previously recognized as commonly infesting potatoes, there were differences in the relative abundance of the species. The green peach aphid comprised a larger proportion of the infestation than it did 5 to 10 years ago. Aphids are the only known vectors of this virus disease, and other workers have determined that the green peach aphid is the most important. The present survey consisted of making collections of aphids from adjacent fields of potatoes and clover, and from adjacent fields of potatoes, clover, and English peas. The collections, obtained before and at intervals on 2 occasions following pea harvest, were made on clover and peas by sweeping the plants with an insect net, while those on potatoes were made by removing the aphids on representative leaves of sample plants chosen at random on the side of the field adjacent to the peas or clover Altogether, 60 collections containing 4,822 aphids were obtained from the 26 fields included in the study. The following table shows the total number of adult aphids of each species which the collections contained.

Insect	Adult aphids obtained from--			
	Potatoes	Clover	Peas	Young clover[1]
	Number	Number	Number	Number
Buckthorn aphid (*Aphis abbreviata* Patch)-----	99	11	0	6
Green peach aphid (*Myzus persicae* (Sulz.))--	127	12	0	23
Potato aphid (*Macrosiphum solanifolii* (Ashm.))	96	14	0	15
Foxglove aphid (*Myzus pseudosolani* Theob.)--	6	0	0	0
Pea aphid (*Macrosiphum pisi* (Klt.))---------	0	450	334	42
Miscellaneous------------------------------	0	38	0	8

[1] In fields from which peas were harvested.

The data show that the collections from potatoes contained adults of only the four species of aphids recognized in previous years as commonly infesting potatoes in that district; those from peas contained mature forms of only the pea aphid; and those from clover contained mature specimens of the three species more commonly infesting potatoes, also the pea aphid and a few of two or three other species. The specimens were identified by using binocular or compound microscopes, under the supervision of P. W. Mason, of the Division of Insect Identification.

Wireworms seriously damage winter cover crops and lima beans in southern California.--A phase of the wireworm-winter-cover-crop investigations, now being conducted at the Ventura, Calif., laboratory, is to determine the extent of damage caused by the sugar beet wireworm (*Limonius californicus* (Mann.)) to lima beans during the growing season. The results in 1941, as reported by M. W. Stone, show that very low wireworm populations were responsible for considerable damage to lima bean plantings, and when populations averaged slightly below or above one wireworm per square foot more than one-fourth of the plants were destroyed. The following table shows the kind of cover crops being tested in three fields, the average wireworm population in 1941, and a summary of the wireworm injury.

Cover crop	Average wireworms per sq. ft., 1941	Reduction in plants in fields			Average reduction in plants
		Field No. 1	Field No. 2	Field No. 3	
	Number	Percent	Percent	Percent	Percent
Barley-------------	1.53	40.9	49.1	17.1	27.2
Mustard------------	.74	33.3	36.5	16.3	25.2
Clover-------------	.78	25.5	17.6	15.5	18.3
Vetch--------------	.50	29.0	--	16.8	21.0
Fenugreek----------	.58	31.0	--	16.5	21.3
Control------------	.36	36.8	12.2	12.0	18.8
Average for all cover crops	--	32.6	32.2	16.5	22.6

Planting of beans in these fields was at the rate of 100 pounds per acre, or at an average rate of 2.5 beans per foot of row. Two weeks after planting there was only 0.96 plant per foot and at the time of harvest only 0.75 plant per foot of row. This shows clearly the extensive damage done by wireworms to both lima bean seed and plants. The results in the above table were based on counts of plants made 2 weeks after planting and at the time of harvest, in 0.01-acre plots, or 174 feet of row located in the center of each plot. The cover crops were planted in November 1939 for 2 successive years and were plowed under early in the spring. There are 16 replicates of the barley, mustard, clover, and control plots and 12 replicates of the vetch and fenugreek plots. A total of 24 1/4-square-foot samples of soil to a depth of 16 inches were taken at random from each plot and sifted for wireworms prior to the planting of lima beans in May and June 1941.

INSECTS AFFECTING MAN AND ANIMALS

Double-action light traps effective in capturing gnats.--A. W. Lindquist, of the Nice, Calif., laboratory, reports that a double-action light trap, fitted with lamps totaling 400 watts, took 55.8 pounds of the Clear Lake gnat, whereas four small single-action traps with lamps totaling 400 watts attracted only 65.5 pounds of gnats. Mr. Lindquist also reports that traps set 7 feet from the ground attract the maximum number of gnats.

Cube dip kills brown winter tick on calves.--Fifty calves, each infested with approximately 500 Dermacentor nigrolineatus (Pack.) and weighing about 125 pounds, were dipped in a portable tin vat 39 inches long, 28 inches wide, and 22 inches deep, containing 25 pounds of cube, 6-3/8 pounds of soap, and 57 gallons of water. H. E. Parish, of the Menard, Tex., laboratory, conducted the test on December 18 and reports that when the calves were examined on December 22 and 29 no live ticks were found. Ticks of all stages were present on the treated animals. Mr. Parish also reports that 1 calf was severely infested with sucking lice when dipped but that no living lice were found when it was re-examined. For dipping, the calves were thrown and all 4 feet tied. With the aid of a block, they were lifted into the vats, back first. The head was then ducked and the calf hoisted over the vat until the excess dip drained into the vat. The operation was completed in about 2½ hours.

Smear 62 meets approval of livestock men.--W. L. Barrett, Menard, has estimated that about 90 percent of the livestock men in southern and southwestern Texas are now using Smear MS-62 for screwworm infestations. Many thousands of gallons of the smear were manufactured and sold in Texas during the last 6 months of 1941, when it was first released to the public. A direct saving to ranchmen has been shown in reducing labor bills by about one-half, because infested animals do not ordinarily need more than the initial treatment.

Ranch-management screwworm-prevention program.--Shearing goats and sheep in August and early in September reduces the December peak population of Cochliomyia americana C. & P. on the western escarpment of Texas, according to observations made by the Menard laboratory. Data obtained clearly show that the December peak populations of the screwworm can be markedly reduced, if not practically eliminated, by ranchers shearing 85 percent of the goats and sheep during the time indicated. Population studies indicate that the December population of this fly is a significant index to the winter carry-over in this part of Texas. No doubt the adjusted wound-treatment practice put into effect on individual ranches accounts for the present reduced population of this pest, as compared with that of a year ago. The populations in all areas in Texas were lower during the period October-December 1941 than for the same periods in 1939 and 1940.

FOREIGN PLANT QUARANTINES

Citrus black spot in Argentina.--Among the items covered in a translation of excerpts from the quarterly bulletin of the Department of Agriculture of Argentina for October-December 1940, made by Roberto Ortiz, is a statement that Phoma citricarpa McAlp. was isolated from mandarin orange, the first report we have noted for this disease in South America.

Entomological interceptions of interest.--Living pupae of the whitefly Aleuroplatus cococolus Q. & B. were found at San Francisco on November 5 on leaves of Guzmania maculata in express from Guatemala. Eight living larvae of the Mexican fruitfly (Anastrepha ludens (Loew)) were intercepted at Baltimore on November 27 in oranges in quarters from Mexico. Living adults of the bruchi Bruchus emarginatus Allard were taken at New York on November 3 in peas in carg from India. Larva and pupa of the bruchid Caryedon fuscus Goeze were taken at Philadelphia on October 21 in tamarind pod in mail from British Guiana. Eighteen living larvae and 10 living pupae of the curculionid Caulophilus latinasus (Say) were intercepted at Hidalgo on November 26 in 1 avocado seed in baggage from Mexico. Fifty-five living larvae of the Mediterranean fruitfly (Ceratitis capitata (Wied.)) were intercepted at San Francisco on November 12 in Coffea arabica in baggage from Hawaii. Eight living adults of the curculionid Cylas turcipennis Boh. were taken at New Orleans on November 8, in sweetpotatoes in stores from Java. Living larvae and pupae of the bostrichid Dinoderus bifoveolatus Woll. were intercepted at New York on August 15 in barbasco roots in cargo from Peru, and on August 6 and September 2 living adults were taken in derris roots in cargo from Straits Settlements and British Malaya. A living larva of the Tahitian coconut weevil (Diocalandra taitensis (Guern.)) was intercepted at San Francisco on November 7 in coconut in baggage from Hawaii. A living larva of the curculionid Epicaerus cornatus Sharp was found at Laredo on October 23 in potato in baggage from Mexico. A living adult of the curculionid Eucalandra setulosa Gyll. was taken at Hoboken on September 30 with Cattleya sp. in cargo from Colombia. Living adults of the bostrichid Heterobostrychus aequalis (Waterh.) were found at New York on September 24 in wooden packing cases in cargo from India. Living specimens of the coccid Lepidosaphes uniloba (Kuw.) were intercepted at San Pedro in August on Alyxia olivaeformis leaves in baggage from Hawaii. Three living larvae of the East Indian bean pod borer (Maruca testulalis (Geyer)) were intercepted at New Orleans on October 30 in string bean in stores from Puerto Rico. Living adults larvae, and pupae of the scolytid Renocis mexicanus Blckm. were intercepted at Chicago on October 8 in bark of Eysenhardtia sp. in cargo from Mexico. Living specimens of the thrips Rhopalothrips bicolor Hd. were intercepted at Laredo on April 17 on cactus bloom in baggage from Mexico. This represents our second interception of this species. A living larva of the tineid Setomorpha insectella (F.) was taken at New York on November 3 in sweetpotato in stores from Peru. A living adult of the lygaeid Sisamnes contractus Dist. was intercepted at El Paso on July 23 with pineapple in cargo from Mexico. A living adult of the endomychid Trochoideus americanus Buq. was intercepted at Hoboken on November 25 with Cattleya sp. in cargo from Colombia.

Pathological interceptions of interest.--*Alternaria fasciculata* (C. & E.) Jones & Grout was found on November 12 at Philadelphia on peppers from Brazil. *Cerebella andropogonis* Ces. was intercepted on July 1 at New York on *Paspalum* sp. seed from Australia. *Cercospora apii* Fresen., which has been intercepted very infrequently for several years, was found on October 13 at Baltimore on celery from Brazil. Determination of *Chlamydomyces palmarum* (Cke.) Mason has just been received for diseased banana stems from Panama found in cargo on August 26, 1940, at New York. What was assumed to be *Colletotrichum gloeosporioides* Penz. was found on August 22 at Hoboken on *Sarracenia* sp. from New Foundland. No reports of a *Colletotrichum* on this host were found. *Diploscapter coronata* (Cobb) Cobb was found on October 17 at Philadelphia in potato tubers from Argentina. *Gloeosporium rhododendri* Br. & Cav. was intercepted at Seattle on September 7 on rhododendrons from England. *Hormodendrum olivaceum* (Cda.) Bon. was intercepted on September 25 at New York in several boxes of apples in baggage from Chile. *Paranthostomella* sp. was intercepted on June 27 at Brownsville on an orchid plant from Mexico. *Phoma citricarpa* McAlp. was found on December 7 at New York on oranges in stores from South Africa. *Phoma nebulosa* Mont. was found on November 20 at New York on parsnips in stores from Australia. *Physalospora camptospora* Sacc. was intercepted on November 3 at San Francisco on plants of *Stanhopea bucephalus* from Mexico. *Puccinia asparagi* DC. was intercepted on November 2, for the first time, on asparagus from Mexico at El Paso. *Septoria dianthi* Desm. was intercepted on November 6 at New York on carnation cuttings in baggage from Brazil. *Uredo behnickiana* P. Henn. was intercepted on August 18 at Hoboken on *Oncidium oblongatum* from Guatemala. *Ustilago rabenhorstiana* Kuehn was found on November 12 at New York on *Digitaria sanguinalis* used as packing for a mail shipment from Uruguay.

DOMESTIC PLANT QUARANTINES

Transit inspection of Christmas trees.--One of the highlights of the year's transit-inspection activities is the inspection of Christmas trees and Christmas greens in the Northeastern States. The Christmas season of 1941 ran true to form, with the exception of the manpower available, which was below that of previous seasons. The interceptions per man-day, however, exceeded that of any previous year. At Boston, the actual number of violations found was greater than that of last year, with the force of 2 inspectors undertaking the work usually performed by 4. Truck, rail, and water movement was closely checked at New York with inspection of mail and express in progress 24 hours a day. The December inspections in the Northeast resulted in interception of 218 violations consigned to 30 States and the District of Columbia, 95 percent of which involved the gypsy moth quarantine. Approximately 55 percent of these infringements were returned to the senders. When shipments of restricted materials also contained gifts or other articles of value every effort was made to inspect them in transit, attach the certificate, and allow them to proceed. Falsely labeled shipments were not so numerous as in past years. However, 1 shipment consisting of a small tree, wreath, branches, and cones was found sewed up in a piece of cloth to resemble a large balsam pillow, which is exempt from certification. At Buffalo, in a 14-piece shipment of clothing and household equipment consigned to Detroit, 1 crate contained 12 uncertified potted plants moving from the Japanese beetle area. The personnel force in the Northeastern region during December consisted of 10 inspectors, including 4 from the Japanese beetle force, and 1 stenographer. The well-coordinated and vigorous programs carried out in the last few years for checking the movement of Christmas greens from the gypsy moth area are showing far-reaching results, according to the regional inspector in charge. The number of properly certified shipments from private individuals has increased by leaps and bounds, he states.

Truck shipments of Christmas trees inspected.--The truck movement of Christmas trees from New England was heavier than in the past and the inspection of several truck markets in New York City and the patrolling of the Boston Post Road at Pelham, N. Y., took precedence over rail inspection. As a result, 122 truckloads of greens and 1 truckload of granite were examined. Two loads were found to be uncertified, 1 consisting of about 1,000 trees bought in Boston, their original source unknown. The transit inspector, on examining about 2 percent of the trees, found a gypsy moth egg cluster. The driver was accordingly instructed to return the load to the gypsy moth inspector at Westfield, Mass., who, according to prior arrangements, checked up on its return and later reported on the disposition of the load. The gypsy moth eggs found on these trees were not viable; however, their presence indicated that the trees came from infested territory and that the load was a highly potential source of more egg clusters. Rail movement of Christmas greens was below normal. Eighty-seven percent of the carload movement of Christmas trees that arrived in New York City came from Canada.

Transit inspection in the Middle West.--In the Central States over 25,000 shipments were inspected in December and 520 waybills were examined, the commodities affected by plant quarantines consisting largely of citrus fruit. Approximately 2,000 L.C.L. freight shipments of nursery stock, granite, citrus fruit, Christmas trees, cotton linters, sweetpotatoes, and peach stock from Texas were checked for quarantine compliance during the month.

Peach trees removed in infected areas.--The December activities of the peach mosaic and phony peach control projects were directed, jointly with the States, toward the destruction of the remaining infected trees found in the 1941 inspection season and of peach trees that have been abandoned or are growing wild. All such diseased trees found in Louisiana, Mississippi, and South Carolina have been removed. Those in Georgia were reduced during the month from 3,000 to 326. In Alabama, Arkansas, Illinois, Missouri, and Oklahoma action is being taken, it is reported, toward cleaning up the remaining infected peach trees known to exist. An additional number of mosaic trees have been taken out of the Hemet district of Riverside County, Calif.

W. P. A. projects for peach-disease control have now expired.--The Federal W. P. A. projects on peach mosaic and phony peach control which have been operated annually since August 1935 expired on December 31, 1941. The funds appropriated for these projects have made it possible to accomplish a great deal more in the control of these diseases than would have been possible with the regular appropriation for this work. During the above 6½-year period, with the aid of relief workers, nearly 90,000,000 abandoned and escaped host plants of these diseases have been destroyed, as well as 484,308 phony-infected trees and 189,840 mosaic trees. Many of the abandoned peach orchards, particularly in the Southeast, were heavily infected with the phony disease and overgrown with pine and other native trees. The removal of such orchards, which were a constant source of infection to nearby healthy nurseries and orchards, has been of inestimable value to the peach industry. To replace these

Federal agency projects, applications have been approved by the State administrators of Alabama, Arkansas, California, Colorado, Georgia, Oklahoma, South Carolina, and Texas, for federally sponsored W. P. A. projects in the State programs. A project application in Tennessee has tentatively been disapproved, because labor will not be available on account of National Defense needs. The Oklahoma project is now in operation.

Citrus canker eradication.--Sixteen inspectors and 126 W. P. A. employees worked in several different areas in Texas in December in locating and destroying seedlings of *Citrus trifoliata*, which constitute a menace to the Federal-State citrus canker eradication program. In Brazoria and Galveston Counties, however, the vigorous measures of extermination of such seedlings at frequent intervals since 1935 have greatly reduced the number of such plants. Only 82 were located in December on 17 of the 37 formerly infected properties in this area. Other areas worked in December included Navasota in northern Texas, where an active infection was found last year. Every property in the town was checked for citrus and over 95,000 seedlings were found and destroyed, as well as a hedge of these trees. At Brenham, in Washington County, rigid inspection and destruction of *Citrus trifoliata* have been carried on since last September for the reason that canker-infected trees found at Navasota, Tex., in February 1941 originated, it is believed, on a property near Brenham. In Harris County unusually close inspection is made at regular intervals of an area made up chiefly of large ranches, because citrus canker was once found on trees in this area which were accessible to cattle, and it is believed that *Citrus trifoliata* seedlings, now found generally scattered over the ranches, have been spread, in part, by cattle pastured in the area during the time the fruit-bearing trees were standing. No citrus canker was found at any point in December. In the extreme southern part of the State, inspection of citrus groves was conducted at Laredo, Carrizo Springs, and Crystal City. No citrus canker has been found in this part of the State for many years.

Chinch bug survey completed.--The survey begun on November 3, to determine the numbers of chinch bugs entering hibernation, was completed on December 13. Surveys were made cooperatively with the States in Illinois, Indiana, Iowa, Kansas, Missouri, Nebraska, and Oklahoma. According to reports from the States, the infestations are considerably lighter throughout Missouri, Illinois, Indiana, and eastern Iowa than for several years. Areas of severe infestation appear to be west of those found in the surveys of 1939 and 1940. The indications are that, under climatic conditions favorable to the pest, severe infestations may occur next spring in southwestern Iowa, southeastern Nebraska, northeastern Oklahoma, and in spotted areas throughout the eastern third of Kansas.

Correction.--In the News Letter dated January 1, 1942, in the note on page 28 entitled, "Mole cricket control work terminated," the percentage of bait distributed in the Plant City, Fla., area should be changed from 3 to 37.

CONTROL INVESTIGATIONS

Two nitrile chemicals effective against flour beetle.--H. H. Richardson and A. H. Casanges, in tests of various chemicals as fumigants at the Beltsville, Md., laboratory, found two nitrile chemicals, acrylonitrile and chloroacetonitrile, to be toxic to the flour beetle (*Tribolium confusum* Duv.). Concentrations of near 2 and 3 mg. per liter gave 50- and 95-percent kill, respectively, of the beetles in 5-hour exposures, at 77° F. under laboratory conditions. Acrylonitrile is also known as propenenitrile and has the formula $CH_2 = CHCN$. Chloroacetonitrile has the formula $CH_2\ Cl\ CN$. Both have the cyano (CN) group present and appear in the vicinity but, as reported in the literature, not quite so toxic as hydrocyanic acid. They differ from hydrocyanic acid in having a slightly delayed killing action. For example, many beetles were still alive and active after a 5-hour exposure to a killing dosage of these nitriles, but all were dead in 3 to 6 hours later. These chemicals, liquids at ordinary temperatures, are available commercially. Acrylonitrile is used in the manufacture of artificial rubber. Chloroacetonitrile appears slightly more toxic than acrylonitrile but is also somewhat less volatile. Acrylonitrile has a boiling point near ethylene dichloride.

INSECTICIDE INVESTIGATIONS

"Thunder god vine."--The continued investigation by Fred Acree, Jr., and H. L. Haller, of Tripterygium wilfordii, commonly called "thunder god vine" by the Chinese (see News Letter v. VIII No. 9, p. 32, Sept. 1, 1941), has shown the isolated toxic fraction to consist of both a crystalline alkaloid and a noncrystalline fraction which likewise possesses alkaloidal properties. The pure crystalline alkaloid is a compound of very high molecular weight, having characteristics exhibited by some other naturally occurring alkaloids. The most striking of these characteristics is that the compound occurs as an ester. Saponification studies have shown the alkaloid to be esterified with at least one molecule of benzoic acid and several molecules of acetic acid. In a toxicity test by E. H. Siegler, the pure crystalline alkaloid appeared to be many times more toxic than nicotine to codling moth larvae.

Study of sodium fluoride and sodium fluosilicate.--Owing to wartime conditions, sodium fluoride has become a very scarce commodity. Sodium fluosilicate, however, should be more readily available because of the potentially large amount of silicon tetrafluoride that can be recovered during the manufacture of phosphate fertilizer. Sodium fluoride has been extensively used in the control of roaches, but sodium fluosilicate, despite reports of good results by some pest-control operators, has not been regarded as satisfactory. R. H. Carter and E. L. Gooden have started an investigation of the chemical and physical properties of all available commercial samples of these two compounds in an effort to determine what characteristics may be responsible for the differing efficiencies of these materials in their use as roach powders. Certain physical characteristics of sodium fluosilicate are probably of importance also for use in poison bait for Mormon crickets.

Particle-size apparatus soon available.--The various field stations that have need for obtaining measurements of average particle diameter of powders will be pleased to know that the self-calculating air-permeation apparatus recently patented by E. L. Gooden (U. S. Pat. 2,261,802 mentioned in the News Letter, v. VIII, No. 12, Dec. 1,1941), is being developed for commercial manufacture by Fisher Scientific Company, who hope to have it on the market by spring.

BEE CULTURE

Breeding of stock important in beekeeping.--C. L. Farrar and C. W. Schaefer, Madison, Wis., report wide differences in honey production between 7 lines of stock tested in 1941. These lines were represented by from 1 to 5 groups of 10 sister queens. Each group represented the progeny of a different breeder queen. Each queen was established with a 2-pound package. Average productions are based on colonies surviving with original queens, sister queen replacements, or supersedure daughters. An average of 3 colonies from each test group had to be eliminated because queens of other stock were used to make replacements. Five groups, line I, averaged 237 pounds of surplus honey. The range in average production for the 5 groups was 184 to 260 pounds. This line has shown superior production in all previous tests. One group, line II, averaged 101 pounds and stock of this line has shown low production in all previous tests. One group, line III, averaged 129 pounds. Three groups of double hybrids, line IV, obtained by crossing lines I, II, and III, averaged 219 pounds and a range in average production for the 3 groups of 188 to 246 pounds. The yield of the double-hybrid line suggests evidence of either hybrid vigor or dominance of the superior characteristics of line I. Three groups, line V, averaged 181 pounds and a range in average production for the 3 groups of 150 to 199 pounds. For 1 group each, line VI averaged 180 pounds; line VII, 145 pounds. The maximum and minimum yields for all colonies carrying through the productive season without supersedure were 341 pounds for line I, and minus 22 pounds for line V.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

Primary larvae of Coleoptera in systematic entomology.--The study of coleopterous larvae, particularly primary larvae generally disregarded by systematists, is proving important in the field of taxonomy. It is through such study that problems in the relationships of various species and groups of species are being solved more and more frequently. There are numerous instances among the Coleoptera in which the systematic placement of a species appears to have been determined by other than characters of the adults. Study of the primary larvae, although not infallible, will sometimes solve these problems with such clarity that there remains little doubt as to the correctness of the solution. One such example is that regarding the systematic position of Schizopus sallei Horn. This species, which in current classifications is placed in the family Buprestidae, has recently (Rees, Wash. Ent. Soc. Proc., v. 43, No. 9, 1941) been shown not to belong to that family, but rather to the Schizopodidae (proposed by Le Conte in 1859).

In order that this example may be more fully understood, some of the facts brought out in this study will be cited. Although buprestid larvae possess characters common to the larvae of several families, there are certain characters that differentiate them from all others, and these main distinguishing characters are present and unchanged, within limits, in the larvae of all stages. Irrespective of the instar, a buprestid larva possesses cribriform spiracles and well-developed dorsal and ventral ambulatory plates in combination with a distinct labrum, but it lacks true legs, prolegs, and ventral glands. A study of the primary larva of S. sallei reveals the absence of dorsal and ventral ambulatory plates and the presence of biforous instead of cribriform spiracles. These two characters alone, disregarding additional contrasting characters, exclude it from the Buprestidae. Furthermore the primary larva possesses well-developed prolegs and ventral glands, characters which exclude it from all other families of Coleoptera. Even though these may be disregarded as examples of specialized development the combination of other characters prevents placement of the species in any known family. Therefore, although the adult bears a superficial resemblance to buprestids and is now placed in the Buprestidae, the study of the primary larva makes it evident to students of both the adults and the larvae that the present classification of this species is incorrect and that the family proposed by Le Conte is warranted.

Another example of the value of primary larvae in establishing a more correct systematic placement was reported by J. W. MacSwain at the recent annual meeting of the Entomological Society of America. His example dealt with the proper position of the meloid genus Poreospasta. For many years this genus was considered distinct from Lytta and was placed in a different section of the family. However, Van Dyke (Calif. Univ. Pubs., Ent., v. 4, No. 12, 1928) indicated that it is rather closely related to Lytta on certain adult characters. MacSwain, studying the primary larva, corroborated Van Dyke's opinion and established the final proof that the genus had been incorrectly placed and in reality belongs in the tribe Lyttini of Leng.

These and other examples show the importance of the correlated study of adults and larvae. Unfortunately only relatively few Coleoptera are known in the immature stages. The larvae of most species, even those of many abundant forms, are not identifiable since they have not been associated with adults through rearing. Careful field and laboratory studies which will establish the identity of larvae are much needed and will contribute importantly to knowledge of beetle classification.

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